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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

_____

Ex parte BYUNG-SUN CHOI

_____

Appeal 2009-003211
Application 10/608,411
Technology Center 2600

_____

Decided: September 29, 2009

_____

Before ROBERT E. NAPPI, MARC S. HOFF,
and THOMAS S. HAHN, *Administrative Patent Judges.*

HAHN, *Administrative Patent Judge.*

DECISION ON APPEAL

    Appellant invokes our review under 35 U.S.C. § 134(a) from the

Examiner's final rejection of claims 1-3, 5-13, 15-18, 20-23, and 25-45.[1]

_____

[1] Claims 5, 6, 8, 11, 15, 16, 20, 21, 25, 26, 28, 31, and 36-45 are reported in
the Final Action, mailed Apr. 24, 2007, as objected to as being dependent
upon rejected base claims, but would be allowable if rewritten in
independent forms that include all base and any intervening claim
Footnote continued on next page

We have jurisdiction under 35 U.S.C. § 6(b). An oral hearing was held on
September 22, 2009. We reverse.

STATEMENT OF THE CASE

Appellant claims an apparatus and method invention for converting
encoded video signals to another encoding, i.e., transcoding. The claimed
transcoding includes (i) decoding a video bit stream to obtain decoded
pictures; (ii) calculating an estimated complexity for a current picture to be
re-encoded; and (iii) encoding the decoded pictures.[2] Claim 1, with disputed
limitations emphasized, is illustrative:

> 1. A transcoding apparatus comprising:
>
> a video decoding unit which receives compressed bitstream and
> performs decoding thereof to output decoded pictures;
>
> *a complexity estimation unit which estimates complexity of a current
> picture* among the decoded pictures to encode the current picture;
>
> a target bit-allocation unit which performs desired bit-allocation using
> the complexity information of the current picture;
>
> a bit-rate control unit which controls bit-rate using bit-allocation
> information and state information from memory, which outputs an
> encoded bitstream; and
>
> a video encoding unit which encodes the decoded pictures on the basis
> of the bit- allocation and state information of the bit-rate control unit,

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limitations (Final Action, ¶ 4). Accordingly, these claims are treated as
rejected (MPEP § 1214.06 (I)).

[2] *See generally* Spec. ¶¶ [44], [46], [50], and [51]; Fig. 6.

> wherein *the complexity estimation unit calculates complexity of a
> picture to be currently encoded, using complexity of decoded previous
> and current pictures output from the video decoding unit and
> complexity of an encoded previous picture output from the video
> encoding unit.*

The Examiner relies on the following published prior art references to
show unpatentability:

Kim	US 2002/0126752 A1	Sep. 12, 2002
Tajime	US 6,915,018 B2	July 5, 2005
		(filed Dec. 22, 2000)

1. The Examiner rejected claims 1, 3, 7, 9, 10, 12, 13, 17, 18, 22, 23, 27,
   29, 30, and 32-35 under 35 U.S.C. § 103(a) as unpatentable over
   Tajime (Ans. 3, 4).[3]

2. The Examiner rejected claim 2 under 35 U.S.C. § 103(a) as
   unpatentable over Tajime and Kim (Ans. 4, 5).

Rather than repeat the Appellant's or the Examiner's arguments, we
refer to the Briefs and the Answer[4] for their respective details. In this

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[3] Although the Examiner does not include claim 35 in a rejection statement
(Ans. 3, 4), we presume, based on the record, that this is a typographical
error with respect to the § 103(a) rejection over Tajime. Other than being a
listed pending claim, this claim is nowhere in either the Examiner's Answer
or Final Action, mailed Apr. 24, 2007, listed or addressed as a rejected or
objected to claim. Claim 35 directly depends from independent claim 1, and
in a non-final Office Action, mailed July 21, 2006, was addressed with claim
1, and other § 103(a) now rejected claims, as being anticipated under
§ 102(e) by Tajime (Office Action, ¶ 5).
[4] We, therefore, refer throughout this opinion to the Appeal Brief filed Dec.
26, 2007, the Examiner's Answer mailed Feb. 6, 2008, and the Reply Brief
filed Apr. 7, 2008.

decision, we have considered only those arguments actually made by Appellant. Arguments that Appellant could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

<div align="center">*Appellant's Arguments*</div>

Appellant exclusively argues independent claim 1 for the grouped claims 3, 7, 9, 10, 12, 13, 17, 18, 22, 23, 27, 29, 30, and 32-35 (App. Br. 11-16; Reply Br. 4-7). Accordingly, we select claim 1 as representative. See 37 C.F.R. § 41.37(c)(1)(vii).

Appellant specifies the following limitations from claim 1 as being disputed:

> the complexity estimation unit calculates complexity of a picture to be currently encoded, *using complexity of decoded previous* and *current pictures output from the video decoding unit* and complexity of an encoded previous picture output from the video encoding unit.

(App. Br. 12) (italicizing substituted for original underlining emphasis). Appellant then asserts that Tajime fails to teach or suggest the recited complexity estimation unit that "calculates complexity of *a picture to be currently encoded*, using complexity of decoded previous and current pictures output from the video decoding unit . . . ." (App. Br. 14) (italicizing substituted for original underlining emphasis).

The same reasons submitted by Appellant for contesting the rejection of claim 1 are asserted for claim 2, which is dependent from claim 1 (App. Br. 16).

ISSUE

Has Appellant shown the Examiner erred in finding that Tajime teaches or suggests calculating a complexity estimate for a current picture using complexities for decoded previous and current pictures along with the complexity of an encoded previous picture, as is recited in representative claim 1?

FINDINGS OF FACT

The record supports the following Findings of Fact (FF) by a preponderance of the evidence:

Present Application

1. The invented transcoding apparatus and method, according to Appellant's Specification, "are capable of improving image quality upon transcoding, by efficiently estimating the complexity of each picture using both complexity information of a decoded picture at a previous time and complexity information of an encoded picture at a previous time." (¶ [12]).

2. As disclosed in Appellant's Specification, picture complexity is calculated for I, P, and B pictures using functions including: (i) the number of bits generated for a picture; (ii) the average macroblock quantization values for a picture; and (iii) a constant representing relative complexity differences among the I, P, and B pictures. (¶¶ [33], [34]).

3. A transcoding apparatus disclosed in Appellant's Specification includes a complexity estimation unit 620 that calculates estimated

complexity for a picture as a function of complexities for (i) a decoded current picture, (ii) a decoded previous picture, and (iii) a previous picture after encoding. (¶¶ [28], [46], and [47]; Equations (3); Fig. 6).

Tajime

4. Tajime discloses an apparatus and method for re-encoding compressed decoded moving pictures. The disclosed apparatus and method includes computing complexity for predetermined periods or numbers of pictures. (Abstract).

5. Multiple related equations are disclosed by Tajime for computing various parameters including complexity for a group of pictures in a plurality of pictures. Two equations (Eqs. 3, 6) are disclosed for calculating complexity. Each of these equations is a function of a constant and two parameters. The constants for these equations are the number of macro blocks per picture times either the number of pictures in the picture group, or the total number of pictures being encoded. The two parameters are summations of characteristic values for the picture group: one parameter is the cumulative number of picture bits for the pictures; and the other parameter is the cumulative quantizer step size values for the pictures. (col. 8, l. 46 – col. 9, l. 20; Equations (1)-(6)).

6. Tajime discloses two re-encoding apparatus embodiments. Both apparatuses include a "complexity measure computing means 101." (col. 8, l. 45 – col. 10, l. 33; Figs. 1, 2).

7. Tajime discloses that "[i]n the complexity measure computing means 101, the picture group complexity measure in a plurality of pictures

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and the complexity measure in all pictures for which encoding was performed are computed . . . ." (col. 8, ll. 11-14).

8. With respect to the two re-encoding apparatus embodiments, Tajime discloses:

> In the first embodiment, in the complexity measure computing means 101 the complexity measure and picture group complexity measure are computed using the input bit stream quantizer step size and input bit stream number of bits supplied from the de-encoding path section 11. According to [the second] embodiment, in the complexity measure computing means 101 the complexity measure and picture group complexity measure are computed using the post-re-encoding quantizer step size and post-re-encoding number of bits supplied from the encoding path section 13.

(col. 10, ll. 23-33).

Kim

9. Kim discloses a video transcoding apparatus for converting a specific bit rate for a bit stream into a different rate for transmission. This transcoding apparatus includes a buffer for storing a processed video signal. (¶¶ [0002], [0152]).

PRINCIPLES OF LAW

An Examiner, in rejecting claims under 35 U.S.C. § 103, must establish a factual basis to support a legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). The required factual determinations are set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (explaining that 35 U.S.C. § 103 leads to these factual inquiries: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art).

Furthermore, the Supreme Court has explained that an obviousness rejection
must be based on:

> "'some articulated reasoning with some rational underpinning
> to support the legal conclusion of obviousness'. . . . [H]owever,
> the analysis need not seek out precise teachings directed to the
> specific subject matter of the challenged claim, for a court can
> take account of the inferences and creative steps that a person
> of ordinary skill in the art would employ."

KSR Int'l v. Teleflex, Inc., 550 U.S. 398, 418 (2007) (quoting *In re Kahn*,
441 F.3d 977, 988 (Fed. Cir. 2006).

ANALYSIS

Obviousness Rejection over Tajime

Claims 1, 3, 7, 9, 10, 12, 13, 17, 18, 22, 23, 27, 29, 30, and 32-35

The Examiner solely relies on Tajime for this rejection (Ans.3, 4), and
concludes that it would have been obvious to an ordinarily skilled artisan to
improve complexity measurement by combining the teachings of a Tajime
Fig. 1 embodiment with those of the Fig. 2 embodiment (Ans. 4). The
Examiner, without citation to Tajime, submits as the sole reasoning and
rationale for such a combination that:

> Doing [so] would provide a compressed moving picture re-encoding
> apparatus and a compressed moving picture re-encoding method that
> realize shortening of the processing delay, improvement of the picture
> quality, and improvement of the encoding efficiency, when
> compressed moving picture re-encoding is performed.

(*Id.*).

We find that Tajime discloses two apparatus embodiments to re-encode compressed moving pictures (FF 4). Both apparatuses are described as including "complexity measure computing means 101" for determining complexity measurements for groups of pictures (FF 6, 7).

Appellant asserts that the Examiner has not shown how a Tajime "complexity measure computing means 101" resulting from the combined embodiments "would calculate the claimed complexity of a picture to be currently encoded" as recited in claim 1 (App. Br. 15). In response, the Examiner submits that both embodiments include a complexity measure computing means 101, and finds that "the complexity measure computing means (101 of fig. 1) is to compute complexity of a picture to be currently encoded" (Ans. 5). This finding is immediately followed with a citation to Tajime column 8, lines 11-14, and an explanation that "all pictures for which encoding was performed are computed, this would fairly suggest the complexity of a picture to be currently encoded is computed" (Ans. 5, 6). Appellant contests this explanation with assertions that:

> Tajime expressly discloses calculating "the picture group complexity measure *in a plurality of pictures* and the complexity measure *in all pictures ....*" Col. 8, lines 11-13. Tajime *does not* mention that complexity measures are calculated for a plurality of pictures, to suggest that a single complexity is calculated for a single picture. Further, Tajime does not even mention that the complexity measure is calculated for *each* of a plurality of pictures.

(Reply Br. 5) (italicizing substituted for original underlining emphasis).

On these matters we find Tajime disclosing complexity computations for a plurality of pictures (FF 4, 5, and 7), not determining any complexity measure for a single picture. Despite the Examiner's finding to the contrary,

we do not find that there is any Tajime teaching or suggestion for determining a complexity measure for a picture, or for using a complexity measure for a picture during re-encoding of video signals.

This Tajime deficiency, we further conclude, is not overcome through combination of the two Tajime apparatus embodiments. We find the differences between the two Tajime apparatus embodiments to reside in what signals are provided to the complexity measure computing means 101, namely, bit streams from a de-encoding path 11 for the first embodiment, and bit streams from an encoding path 13 for the second embodiment (FF 8). The Examiner has not indicated - nor can we find - any Tajime disclosure or suggestion that changing the signal provided to the complexity measure computing means 101 results in calculating a complexity measure for a single picture.

Therefore, based on the record, we conclude that the Examiner erred in finding that Tajime teaches or suggests a complexity estimation unit that estimates complexity of a current picture using complexities for decoded previous and current pictures along with the complexity of an encoded previous picture. (*See* FF 1-3). In order for us to sustain the Examiner's rejection, we would need to resort to impermissible speculation or unfounded assumptions or rationales to supply deficiencies in the factual bases of the rejection before us. *In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967).

For the foregoing reasons, Appellant has persuaded us of error with respect to the rejection of representative claim 1 under § 103(a). We, accordingly, will also not sustain the Examiner's rejection of claims 3, 7, 9, 10, 12, 13, 17, 18, 22, 23, 27, 29, 30 and 32-35 for similar reasons.

Obviousness Rejection over Tajime and Kim

Based on the record, we are persuaded that the Examiner erred in rejecting claim 2 over the combined references. Claim 2 is dependent from claim 1, and covers "an output buffer which stores and outputs pictures encoded by the video encoding unit . . . ."

Appellant asserts that claim 2 is patentable by submitting the same reasons raised in contesting the rejection of claim 1 (App. Br. 16). Thus, Appellant argues that Kim does not cure the asserted Tajime deficiencies.

Kim, we find, discloses a video transcoding apparatus that includes a processed video signal storing buffer (Ans. 5; FF9). The Examiner has not indicated - nor can we find - any Kim disclosure or suggestion concerning a determination of a complexity measure for a picture.

Based on the record, we continue to conclude the Examiner erred in finding Tajime teaches or suggests a complexity estimation unit that estimates complexity of a current picture as recited in base independent claim 1.

For the foregoing reasons, Appellant has persuaded us of error with respect to rejection under § 103(a) of claim 2. We, accordingly, will also not sustain the Examiner's rejection of claim 2.

CONCLUSION

We conclude that Tajime does not teach or suggest calculating a complexity estimate for a picture using complexities for decoded previous and current pictures along with the complexity of an encoded previous picture.

ORDER

The Examiner's decision rejecting claims 1-3, 5-13, 15-18, 20-23, and 25-45 is reversed.

REVERSED

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